(3) *Colleges, Educational Institutions, Special Schools, and Institutions for Purposes of Research.*—Each Associated Institution to remain unaffected in any way, save in so far as it might be willing to adopt the recommendations of the University Council.

The School of Law of the four Inns of Court to be an Associated Institution, and its Professors and Examiners to be Members of the Faculty of Law, but without further direct representation on the Council than that already given to the Council of Legal Education.

The recognised Hospital Schools of London to be Associated Institutions, and their Professors and Lecturers to be Members of the Faculty of Medicine.

The direct representation of the Hospital Schools on the Council being difficult, owing to their number, it might be provided that they should all have one representative, at least, on the Board of Studies of the Medical Faculty.

Schools of Fine Art and Technical Schools employing Teachers, some of whom are not engaged in what can be called, strictly speaking, University work, if composing part of an Associated Institution, to be admissible as Special Schools of the University, and their principal Teachers to be Members of the appropriate Faculties.

Junior Schools forming part of Associated Institutions to be admissible similarly as Special Normal Schools, for the purpose of training Teachers.

Institutions for purposes of Research to be admissible as Special Schools, and their Principals or principal Members to be eligible as additional Members of the appropriate Faculty.

Educational Institutions, of which the work is either in kind or quantity insufficient to entitle them to rank as Associated Institutions, while at the same time partaking of a University character, to be similarly admissible as Special Schools.

(*c*) WORK OF THE TEACHING UNIVERSITY.—The Teaching University to obtain power to confer the usual Degrees, either by way of supplemental Charter to the University of London or otherwise, after such course of study and examination as may be determined on.

As means and opportunity will allow, the Teaching University to appoint Professors in the more advanced studies, and for purposes of original research.

The Council to negotiate with Associated Institutions for the increase of facilities for common attendance at lectures, laboratory work, and admission to Libraries and Museums, and for the concentration of teaching within one or more of such Institutions, or within the University itself, in such studies as may appear desirable.

The extent to which it may be found possible to blend the examinations of the Teaching University with those of the existing University, of the Professional Corporations, or of other Examining Bodies, to be determined hereafter, full liberty of action being reserved to the respective Authorities.

Professors, Lecturers, &c., who are Members of the Faculty, to have the title of "——— Professor, Lecturer, &c., of (or on) ——— " in the proposed University; the first blank denoting the College or Institution with which they are connected, preceded by the title (if any) by which their Chair or other office is known.

Students in Associated Institutions and Special Schools to be at liberty to become Undergraduates in the Teaching University, or to obtain Degrees as at present from the existing University.

Signed on behalf of the Sub-Committee,

REAY, *Chairman*

NATURE-DRAWING [1]

BEFORE explaining the objects aimed at in the new drawing classes proposed to be formed in University College School, to be called Nature-Drawing Classes, let us look back and note briefly what we have achieved up to the present time, and gather if we can from it what kind of foundation we have for the work we are about to do, and what our necessities are in order to secure success. Of the past I am able to speak with some authority, having been connected with the drawing classes in this school for nearly forty years. That we have achieved a very considerable success is proved by the high position these classes are known to hold as compared with similar classes in other public schools; also by the fact that every boy who has taken the "Trevelyan Goodall Art Scholarship" in the school and has competed for the Slade Scholarships in the Slade Schools of Fine Art in University College has, without an exception, succeeded in securing the object of his ambition, and in the case where two of our boys were competitors at the same time, they succeeded in carrying off both scholarships, and all in competition with students older than themselves.

Now it is evident that such remarkable success must rest on some very sound foundation. Though there is no doubt that our method of teaching may account in part for this, and in no small part, yet by far the larger part of the foundation of this success has been laid by the zeal, energy, and intelligence in teaching displayed by the assistant drawing-masters, and I desire frankly, and without any reservation whatever, not only to acknowledge their signal ability and their right to the merit due from the results, but also to acknowledge my own indebtedness to their loyalty in giving effect and unity to the method of teaching, without which our success could never have been secured. The teaching has hitherto ranged from the drawing of simple geometrical forms to the drawing of the figure from the antique, together with mechanical drawing, model drawing, and perspective. And now I have a word for the younger boys, who, sometimes, may find the repeated drawing of curved and other lines a little wearisome, but they may rest assured that they are doing valuable work, and acquiring an invaluable power, for it is mainly in the combination of these curved lines, in the perception of their grace, and the power to render them accurately and freely, that the expression of the most beautiful form, and even the recognition of it, at length becomes possible.

That curriculum in our public schools is best which has the greatest elasticity, and is not bound so closely within the four walls of precedent that it is deprived of the power to expand in any direction to meet the necessities of the times. That the teaching of drawing in our public schools has not advanced adequately to meet these necessities will be, in most cases, frankly recognised by the teachers themselves. But the fault does not lie at their door. It is the "governing bodies" of our public schools, and the outside public, who are to blame. The past low estimate of both alike as to the utility of drawing as a serious study has proved the detriment to its advance. Both have recognised in drawing little more than a sort of harmless amusement to keep children out of mischief when not otherwise employed. Both have been blind to the influence which the imitation of beautiful forms must needs have on the minds of the young, and, yet more, to the influence it must have in after life. A love for beautiful form goes far towards making a beautiful life. While due effect is given to the utilitarian side of education, the æsthetic side cannot be ignored, but through literature and art the æsthetic phase of the student's mind should be developed as widely as possible, and, as a help to this, Prof. Huxley has publicly stated his conviction that it should be made *absolutely necessary* for everybody for a longer or a shorter period to learn to draw, and that there is nobody who cannot be made to draw more or less well.

It is proposed to arrange the new nature-drawing classes under two broad divisions, namely, landscape-art and science-art. Let us deal first with the proposed study of landscape-art, and, in order to make the direction these studies are to take the more clear, it were as well to state the direction they are not to take. They are not to take their direction on the old lines of making, in a blind, ignorant way, copies from the flat to be "finished off" by the more or less facile pencil of the master, and sent home *as the work of the pupil* at the close of the term. The influence of such palpable dishonesty can only be bad, and the more bad because of the openness with which the fraud is committed. It may be asserted that no fraud is intended, but is not almost every child sensible that there is a very real fraud, to which he has been made a party without his consent, when he shows his drawings and is praised for work he is well aware is not his own? Moreover, do you think he does not recognise how frequently and *easily* the fraud succeeds? But enough; let us dismiss it—it is bad. In the "nature-drawing" classes in University College School, landscape-drawing from the flat will be used only to secure with the pencil and the brush that *technique* absolutely needful. Concurrently, lessons will be given in the shape of lectures on natural phenomena, towards inducing a close, intelligent observation of them, in the belief that a boy will not draw an object—a cloud or a tree from Nature—any the worse, or with any the less interest, because he knows something about it, some scientific facts concerning it. Drawing is a record

[1] An address by W. H. Fisk, in part delivered at University College School, Gower Street, London.

of thought as well as of observation, and the measure of thought, as applied to form, is in exact ratio to the knowledge of the causes of it, and the knowledge of them the measure of intelligent delight in observing and recording their results. Accept this as a fact—*art cannot be divorced from science*, for it is science which teaches us to see truly, and by art we render the truth we see. In representing the human figure, this has been a recognised fact for perhaps over two thousand years. They who have drawn the figure finely have been earnest students of anatomy. Yet the anatomy of landscape-forms has been persistently ignored by all but a very few. The recognition of the anatomy of landscape as an art-study is a very modern recognition indeed. Yet to see truly in order to render truly is of as paramount importance in the representation of landscape as in that of the figure. Individual form is a correlation of scientific facts, a knowledge of which enables us to understand its structure and to imitate its appearance with correctness. It is mainly with these that we have to do if we would represent a mountain, a tree, a cloud. It is true that all forms are modified by their environment—by a ceaseless struggle with the varying conditions by which they are surrounded—while the modifications are the result of scientific facts as the forms themselves are. So, if we would represent objects *truly*, science alone can be our guide; for it is science which teaches us to see truly, not through the medium of our fancy, but through the exercise of our intelligence. Thus, for example, in these nature-drawing classes, the structural forms of mountains of granite, downs of chalk, hills of limestone, will be presented and explained side by side with the forms as they at present exist, and which are the results of modifications produced by persistent disintegration and denudation owing to the action of rains, frosts, winds, glaciers, streams, &c., during vast lapses of time. So with the structural forms of trees and their environment—whether of Coniferæ on the limits of the snow line; or trees in a dense forest-growth or on the outskirts of a wood; within the Arctic Circle or in tropical regions; affected by climatic extremes, by drought or excessive moisture; the free access of light or through its deficiency; by the repeated action of winds mainly in one direction distorting the tree, or their influence in many giving a healthy stimulus to the circulation of the sap.[1] It is needless further to pursue the explanation of the plan it is proposed to carry out in landscape-art; enough has been explained to make clear the object in view and the method to be pursued. But the student must be prepared for many objections which will be raised: by painters careless of truth, and by some scientists who will insist on divorcing science from art because they feel their own minds chained by love of minute and beautiful detail, not thinking it possible for other minds to assert their freedom; by painters too lazy to enter the field of science, and who will assert that the mission of the artist is to represent what he sees, or rather what he fancies he sees, no matter whether he sees truly or falsely; or by people who, mistaking a certain deftness of handling for a true representation of natural phenomena, will exclaim, "Surely, if such landscape-art as we have has been sufficient in the past to secure public applause, will it not suffice to retain that applause for the art of the future? or are canvases to be crowded with illustrations of botany, geology, meteorology, bryology, and a host of other 'ologies,' and then to be called landscape-art?" Such talk as this is common enough, but it is sheer nonsense. To the true artist applause is a very small matter: he will not look to the market for the measure of his success, but he will gauge the quality of his own work, whether it be true or whether it be false. The one question with him is whether his picture is to be a painting of fancies which have no existence except in the idle mind of the ignorant painter, or is it to give us a representation of facts: in short, is it to be true or is it to be a sham? No true artist will ignore scientific truth, for he knows that it is next to impossible truly to generalise a multitude of like forms when he is ignorant of the special characteristics of any one individual form of the group. He will not ignore scientific truth, for that truth is the concrete foundation of all noble, all poetical art. There is one sovereign antidote to that poison so dreaded by some timid minds, viz. the chance that rigid illustration of scientific fact will dominate the work, and the antidote lies in the *individuality* of the artist. He will clothe all truth with the poetry of his own nature—with the force of his own character. He will be humbly and faithfully dependent on science for his *knowledge* of all form, but it will be on himself that he will depend for that *expression* of it through the medium of a psychical truth which is extra-scientific, and transcends in beauty the visible form of all natural truth, of which it is at once the sublimation and the epitome.

That division of the nature-drawing classes which I purpose to call science-art, presents in its plan a fourfold object. (1) To induce youths while yet at school to take up, seriously, some branch of natural science, with a view, eventually, to original investigation, and to afford them a power, both with pencil and brush, of accurately recording the results of their observation. (2) To supply that demand which Mr. Norman Lockyer informs us is now being made by scientific men, that students in science shall be able to draw. (3) To supply intelligent and artistic draftsmen for scientific purposes and for the illustrating of scientific works. (4) Mainly and especially to engender in young men, before they leave school to enter on the business of life, a love for the pursuit of scientific truth as being amongst the keenest amusements and the truest and most enduring pleasures of life.

In the ultimate purpose of any instruction lies the test of its future usefulness to the student and to society at large. The teaching of children has in it as much the making of the history of a nation as fighting battles and making laws, and earnest teaching is amongst the grandest employments of life, provided it be noble and useful and good. The teaching which is an inducement to a proper use of time goes far to create an environment which will be beneficial to maintenance and pleasure of life mentally and morally alike, and I know of no better use of time than that of scientific inquiry, which should be encouraged in all our public schools. So with drawing. By uniting it with the pursuit of science it will cease to be subject to that derogation it at present suffers through those who regulate, both within and without, the curriculum of our schools. But here in University College School the governing body is, as is well known, liberal to a fault, and the head master takes considerable interest in this new departure in the teaching of drawing.

Time will not permit me to dwell long on the plan to be adopted in the classes for science-art. At the commencement one or more scientific subjects will be selected. In connection with these the collecting of objects will be encouraged for purposes of investigation and illustration, but collecting for the mere sake of collecting will not be countenanced. Let us take entomology as an example. The student will capture the larvæ of a *few* moths or butterflies. Of each of these larvæ he will make careful coloured illustrations from time to time, according to the results of the changes they may undergo. Faithful drawings of the plants they are fed on will be required, also of any evidences of mimicry, defensive or otherwise. Further drawings will be required of the cocoons of such of the larvæ as form them, also of the chrysalis and of the fully developed insect (together with its eggs) and of whatever mimetic peculiarities it may present. From time to time original papers will be required stating minutely the observations made while the insect is being reared. After a time the more advanced pupils will be required to pursue their investigations into its anatomical structure and functions, with the use of the microscope.

A lucid mind will guide the hand to lucid drawing—the last is, as it were, a photograph of the first. The habit of clearly defining the object in the mind will lead to clear and definite work with the pencil. To students in science the securing of this power while at school will enable such to meet the requirements of science-teachers, and will be a source of economy of time and toil. This will form a branch of the teaching in the science-art classes. Moreover it will be the foundation for realising the third object in view, viz. to supply intelligent and artistic draftsmen for scientific purposes, and for illustrating scientific works. In this branch something more—much more—will be required of the pupil than faithful and intelligent exactness of outline of form. For instance, if the boy is drawing some vegetable form, he will be required to observe, closely, not only the peculiarities of the structure, but the *habit* which is the exemplar of the mind of the plant. Further he will be shown wherein the physical beauty of the plant resides, and wherein lies that beauty which is suggestive of some psychical power which, for a purpose beyond that of mere physical form, has tinted the butterfly's wing and the corolla of flowers fertilised by humming-birds. With such instruction there is no reason why the illustrations in works on natural history should not as far transcend most modern illustrations as these transcend those in a nurseryman's catalogue.

[1] Until the student can go direct to Nature he will draw and paint, in the higher classes, from water-colour studies which have been executed entirely out of doors, and of which a large number have been kindly lent by different artists.

But the chief aim of the science-art classes will be to encourage a pursuit of scientific truth for its own sake, not for the sake of displaying talent in making beautiful drawings to be praised for them, nor for the money to be got for them when drawn, but, *simply and only, for the sake of the* TRUTH, which will yield us pure and incessant pleasure all our lives, and engender a sincere reverence for the Creator who has clothed his truths in wrappages of beautiful blossoms, and pure crystals, and opalescent clouds; in wrappages, too, which appear mean and even ugly, but they are wrappages only; even sin—that, too, is a wrappage, and looks very ugly, and is very revolting, but it covers some good, some truth which lies hid in every human heart, if we will only seek to find it.

There is a vast amount of real art-power unutilised, and so wasted, in our public schools, through narrowness of purpose in the teaching. It has been so amongst ourselves, though what we have done we have done thoroughly. We have laid a sound foundation in close observation of beautiful form and acquisition of technical power in representing it. In adding to it these nature-drawing classes, we have nothing to unteach. The field of work is simply widened that the power may be the more effectually utilised with more pleasure and with greater profit to the student, not only while at school, but as a pursuit in after life, and possibly drawing many from pleasures which are ugly, coarse, bad, and fleeting. This is a view of nature-drawing which parents might think about not without profit to their children. The pursuit of scientific truth, whether in the shape of landscape-art or of science-art, is a very noble pursuit, a very lasting pleasure; besides which science and art cannot fail to be mutually benefited, mutually advanced, in the long run, by such a conjunction as this, for indeed art loses her right hand when divorced from science, and science loses her right hand when divorced from art.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The following have been elected to the General Board of Studies:—Mr. H. M. Taylor, by the Special Board for Mathematics; Prof. Liveing, by the Special Board for Physics and Chemistry; Dr. Vines, by the Special Board for Biology and Geology.

The election to the Cavendish Professorship of Experimental Physics will take place on December 22. The endowment of the professorship is 850*l.* a year.

The provision of 100 additional microscopes for the Biology Schools has been sanctioned, and a small charge will be made to students for their use.

Mr. C. T. Heycock, of King's College, has been approved as a Teacher of Chemistry, under the regulations for medical study.

The Syndicate for obtaining plans for a Geological Museum and Chemical Laboratory has been re-appointed.

Clare College offers to give scholarships of from 40*l.* to 60*l.* for Natural Science by examination, beginning March 19 next. The subjects will be Chemistry and Chemical Physics, Botany and Geology. A fortnight's notice will be required. Candidates, who must be under nineteen on the day of examination, must also pass in Elementary Latin, Greek, and Mathematics.

It is announced that in the next Fellowship election at St. John's College (November 2, 1885) regard will be paid to candidates' original dissertations or other writings, the candidates to be prepared to be examined in the subject-matter of the same. Candidates may also be examined in special subjects chosen by themselves, provided they give full and precise information regarding such subjects not later than June 1. The performance of the candidates in the University and other examinations will be regarded.

SCIENTIFIC SERIALS

Journal de Physique, October 1884.—The constitution and origin of group B in the solar spectrum, by M. L. Thollon (one plate).—On the colour of water, by M. J. L. Soret.—The effect of the electrical state of the surface of a liquid on the maximum vapour-tension of the liquid in contact with the surface, by M. R. Blondlot (one figure).—On the measurement of the maxima and minima electromotive forces in cells with a single electrolyte, by M. Emile Reynier (two figures).—Standard cell for the measurement of electromotive forces, by M. Emile Reynier.—On the chemical theory of accumulators, by M. Emile Reynier.—On the electrolysis of solid glass, by E. Warburg.

Journal of the Russian Physico-Chemical Society (Physical Section), vol. xv., 1883.—On an air-calorimeter, by N. Hesehus.—On a differential air-calorimeter, by W. Preobragenski.—On the critical temperature of isomerides and bodies belonging to the same homologous series, by A. Nadejdine.—New application of Carnot's theorem, by B. Sresnewsky.—On an algebraic transformation and its applications to mathematical physics, by by N. Slouguinoff.—On the focal properties of diffracted rays, by M. Mertching.—On the peculiar properties of caoutchouc, by N. Hesehus.—Method of determining the mean tint of a multi-coloured surface, by Th. Petronchewsky.—On the cause and the law of the change of electrical resistance of selenium by the action of light, by N. Hesehus.—On the relation between the magnetic moment of a bundle of iron wire, its mass, and the diameter of the constituent wires, by P. Bakmetieff.—Note on organ-pipes, by P. Bakmetieff.—On some phenomena of permanent magnetism, by P. Bakmetieff.—On the luminous phenomena accompanying electrolysis, by N. Slouguinoff.—On the theory of gratings traced on curved surfaces.

Royal Academy of Belgium, Nos. 9 and 10, 1884.—Among other communications is a paper by Dr. J. MacLeod describing some interesting particulars respecting the structure and homologies of the anterior intestine of the *Arachnides*. In the *Phalangides* he has found a gland of the same nature and function as the coxal glands recently described by Prof. E. Ray Lankester as belonging to the *Limules*, the *Scorpionides*, and the *Aranecides tetrapneumones*. In the *culs-de-sac*, moreover, of the male gland of the *Trombidium holosericeum*, he has found, in all the individuals examined by him, ovules situated between the mother-cellules of the spermatozoides, though there was no question there of a functional hermaphroditism.—A paper by Emile de Borchgrave gives a graphic sketch of the history of Etienne Douchan, Emperor of Servia, and the Balkan Peninsula in the fourteenth century, and of the events which led up to the battle of Kossovo, the grave of the liberty and greatness of Servia.

Cincinnati Society of Natural History.—In the October *Journal* are two papers by U. P. James: one describing four new species of fossils from the Cincinnati group, the other treating of Conodonts and fossil annelid jaws.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, December 11.—J. W. L. Glaisher, F.R.S., President, in the chair.—The Rev. T. C. Simmons, Christ's College, Brecon, and Mr. W. J. Ibbetson, Clare College, were elected members.—Mr. Tucker read a paper on a group of circles connected with the nine-point circle considered as the locus of the intersections of orthogonal Simson lines. If PL, PM, PN are the perpendiculars from any point of the circum-circle on the sides BC, CA, AB of ABC, then LMN is a Simson line: if POP' be a diameter, then the Simson line $L'M'N'$, corresponding to P', intersects LMN at right angles in a point Q, on the nine-point circle, which is also the inscribed circle of the tricusp, enveloped by the Simson lines. These properties were stated in a paper by Steiner ("Crelle," Band liii.). In the present paper points l, m, n are taken on PL, PM, PN, such that $Ll = K.PL$, $Mm = K.PM$, $Nn = K.PN$. It was shown that the lines lmn, $l'm'n'$ intersect at right angles on a system of circles whose centres lie on the line connecting the circum-centre and ortho-centre (H) of ABC, that the sets of Q points (as above) lie on another straight line through H: that the circles are inscribed in tricusps, the points of contact lying on three straight lines symmetrically situated and passing through H. In the special case of nul-radius, *i.e.* when the (K) circle becomes the ortho-centre, it was seen that the images of any point on the circum-circle with regard to the three sides lie on a straight line through H.—Mr. Tucker then read parts of a paper by Mr. R. A. Roberts, entitled "Notes on the Plane Unicursal Quartic."—Two posthumous notes by the late Dr. Spottiswoode, P.R.S., were communicated, viz. on quadratic transformations, and to find whether a (certain) quadratic transformation be possible.—The Treasurer (A. B